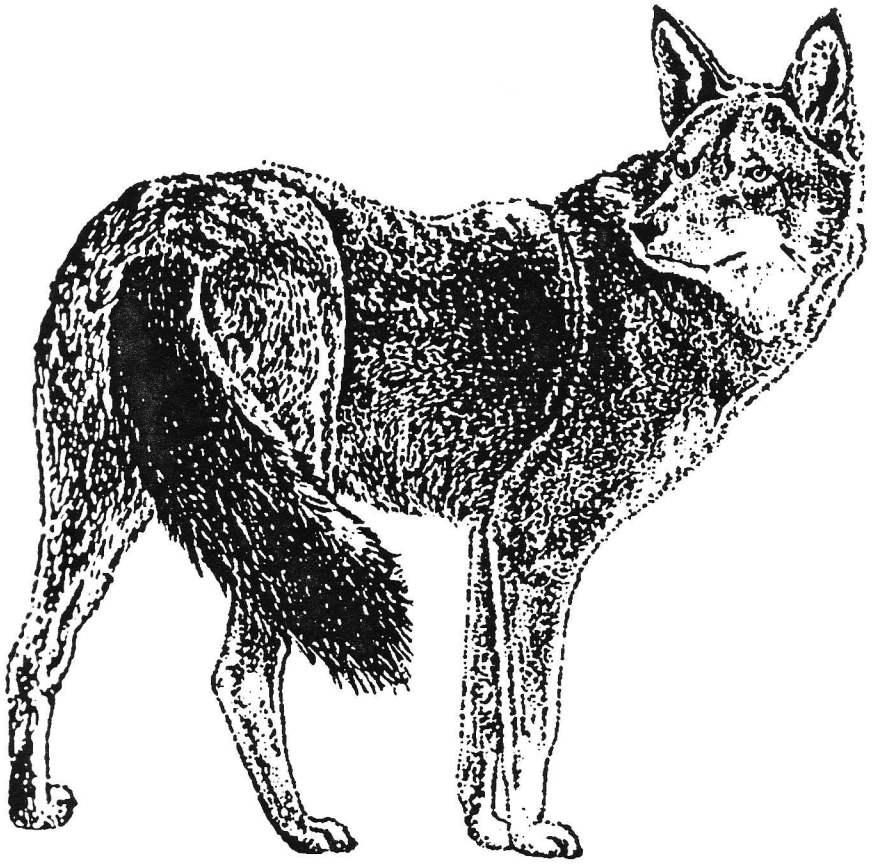
U.S. Fish & Wildlife Service - Southeast Region - Atlanta, Georgia

Red Wolf Reintroduction Lessons Regarding Species Restoration

Red Wolf Management Series
Technical Report No. 12



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RED WOLF REINTRODUCTION LESSONS REGARDING SPECIES RESTORATION

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This paper originated as a presentation given at the American Chestnut Foundation Symposium on Species Restoration held in Chattanooga, Tennessee, on April 7, 2000. This Symposium was part of the 61st Annual Meeting of Southeastern Biologists. The invitation to speak at the Symposium stated that a full-text version of the paper would be published in a Symposium Proceedings by the Journal of the American Chestnut Foundation. However, a decision was later made to publish only a condensed version that would be limited to 1500 words (about 2 pages). We believe a condensed version would not contain many of the specifics that would be of interest to restoration practitioners. Therefore, we decided to make a slight change in the title and publish this full-text version as one of the Service's in-house Red Wolf Management Series Technical Reports.

INTRODUCTION

The most recent systematics work on wolves in Eastern North America, based on an analysis of every available specimen of wild *Canis* within this region, concluded that the red wolf (*Canis rufus*) originally inhabited the entire forested region of Eastern North America from the Gulf Coast to just south of the eastern Great Lakes (Nowak and Federoff 1996). However, the red wolf became a victim of man's activities, the most important of which were probably extensive predator control and habitat alterations, such as land clearing, that favored the closely related coyote (*Canis latrans*). As a result, by 1972, the species' range had shrunk to parts of six counties in southeastern Texas and one parish in southwestern Louisiana (Riley and McBride 1972).

U.S. Fish and Wildlife Service (Service) field work to assess the situation, beginning in 1968, demonstrated that extensive hybridization with coyotes had brought the species too close to extinction for the species to be saved in its last occupied habitat. Therefore, the Service made the decision to remove the last remaining red wolves from the wild; to begin a captive-breeding program; and, if captive breeding successfully increased the population, to eventually reintroduce them back into suitable historical range (Carley 1975). Red wolves were identified by comparison to a set of morphological standards (primarily minimum weights and measurements) that were developed from red wolf museum specimens which had been collected around the turn of the century. This was believed to have been prior to substantial hybridization with coyotes. Eight years of effort (1973 to 1980) resulted in the capture of over 400 *Canis*, 43 of which met the red wolf morphological standards and, thus, appeared to be good red wolves. Since morphology alone is not a certain determinant of genealogy, the final identification decision was based on breeding experiments. Only 14 animals that did not produce hybrid offspring met the final criteria to become the founder population of future red wolves. The species was declared extinct in the wild in 1980, placing the species' future existence in the hands of captive-breeding cooperators.

The most recent recovery plan revision defined recovery as 550 red wolves, with 220 in the wild in at least three reintroduction sites and 330 in captivity at 30 or more facilities (U.S. Fish and Wildlife Service 1990b). At the end of the 1999 calendar year, the red wolf population numbered 231 to 322, with 65 to 154 animals in the wild at two locations, 7 to 9 animals on two

island propagation sites, and 159 animals in captivity at 32 facilities located in 20 states and the District of Columbia.

The Service began the first reintroduction in 1987 at the Alligator River National Wildlife Refuge (ARNWR) in northeastern North Carolina (NENC) (U.S. Fish and Wildlife Service 1987a); as of December 31, 1999, the population was 65 to 124 animals. One important characteristic of the area where the releases began was that it was believed to have no coyotes, because the eastern expansion of the coyote had not yet reached this location on the Atlantic Coast. However, with the continuing eastward expansion of the coyote and the westward expansion of the reintroduced red wolf, the two species are no longer parapatric. Hybridization between the two has occurred since the populations have become sympatric, but known hybridizations have been controlled by management actions to remove the hybrids. This renewed threat to red wolf integrity prompted a population and habitat viability assessment workshop attended by 43 technical and management experts from the United States and Canada in 1999. A preliminary estimate was made at this workshop that if the known rate of hybridization had not been controlled, but instead had actually occurred, the red wolf population in NENC would be unrecognizable as such within 12 to 24 years. The workshop generated recommendations for an adaptive management strategy to replace coyotes with red wolves and slowly expand a viable and self-maintained red wolf population westward to inhabit all suitable habitat within the restoration area (Kelly *et al.* 1999). These recommendations are being implemented.

The Service initiated a second reintroduction in 1991 in the Great Smoky Mountains National Park (Park) in eastern Tennessee (U.S. Fish and Wildlife Service 1990a). The Service made the decision to terminate the project in 1998 based on the lack of survivability in pups and the inability of the red wolves to establish home ranges within the Park. Over 8 years, 37 red wolves were released; 26 of them were recaptured from, or died, outside the Park (U.S. Fish and Wildlife Service 1998). With the exception of five pups that were removed for management purposes at 6 to 10 months of age, there was no known survival of the remaining 28 pups born in the wild.

METHODS

We will simply summarize briefly, in general, some of the techniques, methods, etc., used in the red wolf recovery program. Many of these were modified or developed for use in this program.

Captive-breeding was utilized to increase the red wolf population to a point where surplus animals were available for reintroduction. This is a cooperative program currently involving 32 institutions and is designed to ensure genetic and demographic management of the species. Genetically well-represented red wolves are then utilized in releases. Unfortunately, some animals develop a tolerance toward humans during captivity that can lead to unacceptable behavior and poor survival in the wild. In an attempt to counter these potential problems, islands off the Atlantic and Gulf Coasts are used as propagation sites in order to provide the animals an opportunity to obtain wild experience before being reintroduced into mainland sites (U.S. Fish

and Wildlife Service 1987b). The wild offspring from animals on the islands are even more valuable because they have not been raised in a captive environment; thus, they have not developed a tolerance of people. These islands are essentially a steppingstone between captivity and the wild.

Variations in the specific release techniques have been employed over the course of the program, depending on the stage of the program, the time of year, the animal's history, and the size and land use of the specific property. Initially, red wolves are acclimated in small pens at the release sites for varying lengths of time. They are usually "soft released" from the pens by simply leaving the door open and gradually weaning them off supplemental food. This eases the transition to the new location and the transition to capturing prey on their own. In other situations, single animals or pairs may be transported to a site and "hard" released directly from a kennel. The released and wild-produced animals are monitored by standard commercial radio telemetry equipment using transmitter neck collars. Management consists primarily of live captures for various reasons, such as attaching or replacing radio transmitter collars; the movement or removal of animals to prevent or correct unacceptable behavior; and the movement, replacement, or insertion of prospective mates for genetic purposes. Captures are normally accomplished by leg-hold traps, modified in various ways to reduce or prevent the risk of injury. Released and captured animals are vaccinated against standard canine diseases and are sometimes dosed with a parasiticide.

RESULTS AND DISCUSSION

There are many lessons to be learned from the red wolf recovery program that might be useful in other species restoration programs, including some that probably did not come to mind as we were preparing this paper. We will list those that were perhaps most obvious and useful. We attempted various ways of categorizing and/or ordering these lessons without complete satisfaction. The final list is not by priority; it is a compromise list that starts with biological lessons and generally proceeds through management, social, communications, and fiscal type lessons. The list largely reflects the order in which the lessons were learned in the process of implementing the recovery program. Some may be specific to wolves, predators, or mammals, but most are probably important in any restoration program. We continue to learn new lessons as we proceed, and many other restoration programs have undoubtably already benefited from these lessons and applied them in other restorations.

Begin Considering Restoration Before the Taxon is on the Brink of Extinction

The red wolf was very close to extinction before anyone realized it. McCarley (1959, 1962) first alerted the world to its precarious situation, and Pimlott and Joslin (1968) followed with a survey that could only confirm the continued existence of red wolves in coastal Texas and Louisiana. One reason for the lack of knowledge about the red wolf's doubtful future is believed to be that *Canis* were still found in much of the red wolf's historical range. These were assumed to be red wolves but were likely coyotes and/or hybrids. This situation led to the need to remove the last

red wolves from the wild and place them into captivity to save the species from extinction. Obviously, options are extremely limited when a species gets to this point. As a result, we lost the opportunity to study the animal in the wild and had to implement a recovery program based on limited biological information. Much of the baseline biological information has had to be gleaned opportunistically while work progressed, with the primary focus on the logistics of getting the wolves out and averting public relations problems. This increases the time frame necessary to restore the species and the cost of restoration.

If Possible, Avoid Areas Inhabited by Closely Related Sympatric Species

The recent significant use of molecular biology to examine genetics and the evolutionary relationships between organisms has shown that introgression between related taxons is more common than once realized and is important in the evolutionary process (Mayr 1970). All members of the genus *Canis* have a diploid chromosome number of 78 and, based on mounting evidence from captive-breeding and genetic and morphological studies of wild stock, likely can interbreed and produce fertile offspring (Nowak 1978, Wayne 1993). Interbreeding between red wolves and coyotes was "the straw that broke the camel's back" with regard to the red wolf's future. Our first reintroduction in northeastern North Carolina worked very well until the eastward expansion of the coyote reached the area. Our second reintroduction was within areas inhabited by coyotes and was not successful in restoring red wolves. Although not the primary reason for the lack of success, the presence of coyotes was a contributing factor, causing red wolf mortalities and necessitating management actions to control potential interbreeding, which did occur in the early stages of the project.

Restore Species Within Their Historical Range

Extensive literature documents the havoc created by introducing species outside their historical range; Wilcove (1999) summarizes much of this literature. When species have not evolved together, effects such as excessive predation, excessive competition, unfamiliar disease and parasite transmission, etc., can be expected and can lead to extirpation of native species. Related to this are the impacts from species that were aided in expansion of their historical ranges by man's activities. A good example is the coyote, which was originally found throughout most of the western half of North America (Nowak 1979). In conjunction with the extirpation of native wolves and land clearing in the Eastern United States, the coyote has now expanded its range eastward to the Atlantic Coast. However, personal experience and contacts with state wildlife agencies lead us to believe that introductions of coyotes by private citizens, most commonly to provide an animal to run with dogs, contributed more than natural expansion to this increase in range. Regardless of the circumstances that resulted in coyote expansion, the result is a predator that is much more difficult to control than red wolves and one that now compromises red wolf reintroduction attempts because of interbreeding risks.

Utilize Wild Stock if Available

The red wolf recovery program has proved that animals can be restored using captive stock. However, the program has also revealed that restoration is much more difficult, time-consuming, and expensive using captive animals. Despite best efforts to instill or maintain wildness in captive animals, some of them will become too tolerant of humans and their activities. The results are problems that require management actions, low survivability, and the potential erosion of public support. A good comparison to the red wolf program is the reintroduction of gray wolves into the northern Rocky Mountains. Red wolf releases began in 1987, and the present wild population consists of about 80 animals, whose future is insecure. The Rockies reintroduction, using wild animals captured in Canada, began in 1995 and numbered 238 in the fall of 1998 in two populations (Bangs *et al.* 1998). Although other factors, such as acreage of public land, lower human populations, and high prey densities are also important, the use of wild stock is believed to be a major factor in this rapid initial success.

Develop and Test Reintroduction Techniques Before Attempting Restoration

Wolves had not been successfully reintroduced anywhere when the red wolf recovery program was initiated. In addition, the lack of life history information on the species left many uncertainties regarding how to reintroduce wolves. Therefore, the Service decided to first release red wolves on an island to test the waters and work out techniques. Bulls Island, part of the Cape Romain National Wildlife Refuge off the Atlantic Coast of South Carolina, was selected for the experiment. In 1976, a pair of red wolves was placed in a pen on the 2,000 hectare (5,000 acre) island and was released following a 5-week acclimation period. Although this island was separated from the mainland by 1.6 to 2.4 kilometers (1.0 to 1.5 miles) of water and marsh, the female made it to the mainland within 1 week following release. The Service recaptured both animals, returned them to captivity, and revised techniques to address the problem of the female not staying on the island. It was thought that the acclimation period may not have been long enough to make the animals comfortable in the new location and to break the comfort bond they had with their previous location. A second attempt was made with another pair of animals in 1978; they were acclimated for 6 months before release. In this trial, the animals remained on the island for about 11 months before being removed. Although we have varied acclimation periods since these first attempts, these results illustrate the importance of the length of the acclimation period and the importance of testing techniques.

Build in Back-up Systems to Address All Possible Adversities

The old adage "if anything can go wrong it probably will" should be applied to reintroductions. You should plan for any and all contingencies. An example would be loss of radio contact with red wolves due to telemetry equipment failures. This would obviously obstruct the ability to monitor animals and manage potential problems. Therefore, the first animals released, which were critical to the demonstration of our ability to monitor and manage the population, were

equipped with a back-up telemetry system in case the radio collars malfunctioned. This consisted of abdominal transmitters that were implanted in the released animals.

Provide a Means for Captive Stock to Slowly Adjust to Wild Conditions

Captivity may affect the ability of the animals to live in the wild. In the case of red wolves, this was manifested in two ways, both of which were believed to be largely due to the fact that they acquired a tolerance of humans and their activities. First of all, there is poor survival. Animals that become tolerant of humans are obviously more susceptible to direct taking by humans using guns or traps. In addition, animals that are tolerant of humans may frequent areas that make them more vulnerable to indirect taking by man's activities. Vehicle collisions are a good example, because they are one of the most common causes of red wolf mortalities in NENC (Phillips *et al.* 1995). Secondly, their tolerance of humans results in the removal of red wolves to alleviate actual or potential problems. We attempted to address these problems by placing animals on island propagation sites where they could live, gain experience in the wild, and raise their pups to maturity (U.S. Fish and Wildlife Service 1987b). We have utilized four different islands off the Atlantic and Gulf Coasts for this purpose. The animals are then moved to mainland reintroduction sites when needed. However, because of the varying periods of captivity involved in capturing red wolves on the islands and transferring and releasing them at mainland sites, it is hard to evaluate the impact of wild experience on the survivability and behavior of released animals.

Ensure That Sufficient Access is Available to Manage Populations

The importance of access will vary depending on the species, but it is significant for a large predator like the red wolf, which has large territories and can travel considerable distances in a short amount of time. One of the problems with the Park reintroduction that hampered our ability to manage the red wolf population was poor access because of few roads, road closures to vehicles, and the location of roads, which are largely confined to the ridges and bottoms with little access in between. At times, it could take a half day to simply get to a location to get a radio signal from an animal. The mountainous forested terrain was a significant deterrent to telemetry work, even with good access, because of the difficulty of achieving a line of sight between the wolf transmitter and the receiver. Monitoring by air was also hampered in this mountainous terrain because of the reduction in suitable flying days due to weather conditions.

Consider Potential Contributions of Private Land

It was originally thought that the restoration of red wolves would be dependent solely on public land, because private landowners would not want these animals on their land due to the perceived potential for livestock depredations and threats to humans. It became obvious early in the program that ARNWR was too small to contain a viable red wolf population. Individual red wolves moved onto private land within the first month, and agreements with landowners to allow red wolves on their property followed. At present, owners of almost 200,000 acres of private

land have agreed to allow red wolves to inhabit their property (Gilbreath and Henry 1998). Added to the public land inhabited by red wolves, this private land represented 35 percent of this total land base. However, this private land is home to about 57 percent of the known red wolf population. This suggests that private land may provide better habitat and may support more red wolves per comparable land area than public land.

Minimize Impacts to Traditional Land Uses

People resent infringement on the traditional uses of the land. Public land is often heavily used, and has been for generations, by the local public, who are often resistant to any regulatory and/or land management changes. Private landowners can be even more resistant to proposals that may, or just appear to, affect the traditional use of the land. A private individual or corporation that acquires sizeable acreage and then restricts traditional uses by such things as posting the land against trespassing may be viewed as an outsider and may encounter considerable public relations problems with his neighbors. The NENC reintroduction site centered on the ARNWR, was donated to the Service by the Prudential Insurance Company in 1984. It is a peninsula, almost completely surrounded by water, of terrestrial habitat with dense understories and some large agricultural fields. The traditional land uses continued after the site became a national wildlife refuge, including farming the large agricultural fields, hunting, trapping, firewood gathering, etc. It is currently the only national wildlife refuge allowing the hunting of deer with dogs. We have found that these uses are not incompatible with red wolf restoration, and the decision to not infringe on these uses because of the red wolf reintroduction is believed to have positively affected public attitudes toward the reintroduction.

Remove Problem Animals

Although there is a contingent of the public that believes that wildlife were here first and should be given priority in all human/wildlife interactions, problem animals will cause a significant erosion of support unless they are removed promptly. It is easy to support wildlife priority rights if one's financial well-being is not affected. It is a different story if you are adversely impacted in a direct way by the loss of a pet, livestock, etc. The support of residents in the local area is key to successful reintroductions, and their concerns must be accommodated, if possible. Advocation of wildlife priority rights emphasizes the welfare of individual animals to the detriment of the population or species. It does little good to win a battle by protecting an individual animal and thus lose the war by eroding the support of the local residents. Keep in mind that humans removed red wolves historically because they did not want them. If the local residents do not largely support the program, it is doomed to failure because the local people can again remove or control the red wolves. Although wildlife protection laws are more common now and are better enforced, law enforcement officers will always be few in number relative to the number of people on the landscape. As a result, evidence sufficient for prosecution for the taking of red wolves is hard to come by, resulting in few, or no, successfully prosecuted cases.

Compensate Private Landowners in Case of Economic Losses

Adverse economic impacts to landowners are not conducive to obtaining support from these individuals, and, if negative impacts are widespread, support from residents not directly impacted may also erode. The common adverse impact experienced from predators is depredation on domestic animals. Therefore, a compensation program was put in place to reimburse owners of domestic animals at fair market price for depredations by red wolves. Compensation paid out, so far, totals $12,765.50, with $4,940 for depredations of 41 newborn goats, 1 chicken, and 1 hunting dog over a 13½-year period in NENC and $7,825.50 for depredations of 21 calves, 2 subadult cattle, and 4 chickens over a 7½-year period on land adjacent to the Park. This removes the unfair economic burden of the program from the few individuals who happen to live in the restoration area. We believe this is a cheap price to pay for the continued support of the local residents who are most impacted by red wolf reintroductions. We also established what we called a "good neighbor" policy, placing the burden of proof on the Service to determine that depredations were not due to red wolves in order to avoid compensation. In other wolf management programs, compensation is only paid if there is proof that depredations were caused by wolves. This policy, however, has a down side in that compensation may be considered by some people as proof that the red wolves caused the depredation.

Coordinate With Other Potentially Impacted Agencies

Support from other agencies is important to the success of reintroductions. Overlapping regulatory or land management responsibilities may necessitate, or public concern, education, or other interests may promote, other agency involvement. In the case of the red wolf, the state wildlife agencies are integral participants because of their responsibilities for resident wildlife species. The red wolf, as a predator, can impact resident species, and if and when the reintroduction is successful and recovery is achieved, the species would be delisted. It would then become a resident species and would therefore become the responsibility of the state. Although state agencies have not been active supporters of red wolf restoration because of opposition from some of their hunter constituents, proper coordination has resulted in neutrality and no active opposition. This may be the best one can hope for in many cases, but it allows the initial freedom and opportunity to demonstrate the true nature of the species and its role in the ecosystem.

Conduct Extensive Outreach Efforts, Especially Targeting Potential Adversarial Groups

The first attempt at reintroduction of the red wolf amply illustrates the importance of outreach. In 1979, the Tennessee Valley Authority offered Land Between The Lakes, which straddles the border between Tennessee and Kentucky, as a potential reintroduction site. Evaluation of the area was conducted from 1981 to 1984, concentrating on the biological feasibility of the area and doing minimal outreach work (Carley and Mechler 1983). As a result, the project was opposed by such groups as livestock owners, deer hunters, and animal rights advocates, which translated to a lack of endorsement from the state wildlife agencies. The lesson regarding the importance of

outreach was overpowering. For the next proposed reintroduction in NENC, we made plans to follow a biological evaluation with extensive outreach efforts over a 1-year period. These efforts concentrated on altering the "big bad wolf" image by explaining to people the true biological facts regarding the wolf's nature and its importance in maintaining healthy ecosystems. Our motto was "have slides, will travel," and we honored any and all requests to talk to people about the red wolf. We especially targeted congressional, agricultural, hunting, and other contingents that could have been potential adversaries. The outreach efforts were followed by public meetings at which public support was expressed. The proposal to reintroduce red wolves into NENC published in the *Federal Register* generated 12 responses, and all of them supported the proposal. This same approach has been, and will be, used in other proposed red wolf reintroductions.

Emphasize Positive Impacts on Ecology and Economics

Economic impacts have always been important to people, and recent increases in knowledge and concerns about environmental matters have made impacts on ecology important to many people. Economic studies showing tremendous possible returns from the presence of red wolves and the willingness of a majority of local residents to contribute financially to the program was publicized and is believed to have played a role in garnering support for the program (Mangun *et al.* 1997, Rosen 1997).

Outreach efforts emphasized the ecological role of the red wolf and the resulting benefits of restoring it to the wild. The missing component from all terrestrial eastern ecosystems is the historical top predator--the red wolf (as well as the cougar). Symptoms of the ill health of these ecosystems as a result of this missing ingredient are abundant and persuasive. Deer overpopulation results in large economic losses to farmers and other landowners due to browsing, and the general population suffers losses from vehicle collisions on the highways. Not only are there economic losses from these vehicle collisions, but there can also be a significant toll in the loss of human lives. Deer overpopulation causes periodic disease outbreaks that would likely be abated or reduced if predators were present to control the populations. The expansion of the coyote into the east has resulted in the presence of a predator that is much more difficult, if not impossible, to control than the red wolf. Also, the burden of depredation losses from coyotes is borne by the owner of the animals that are preyed upon; whereas, red wolf depredations are compensated for during the recovery program.

The absence of the red wolf has also contributed to the proliferation of mid-line predators, such as raccoons, skunks, opossums, and coyotes. Overpopulation, in turn, has resulted in excessive depredations by these predators on ground-nesting birds, such as quail, grouse, and turkey. The effects of red wolf predation on some small mammals, including predators, and the expected positive ecological consequences have been reported (Esher and Simons 1993, Weller 1996). Some researchers have advocated the reintroduction of red wolves as the likely solution for this problem (Hurst *et al.* 1996), and we have been approached by a coalition of Federal, state, and

private landowners and hunt clubs to reintroduce red wolves to help solve the problem. Another state agency is a cooperator in one of our island propagation projects because of the control exerted by red wolves on raccoons. The raccoons were decimating sea turtle nests and required a significant amount of manpower to control (trapping and shooting). At least one private landowner has also expressed positive sentiments about the red wolf in terms of controlling nutria, which were breeching water control structures, and thinning deer populations, which results in the presence of more trophy bucks.

For Outreach Purposes, Take Advantage of Areas Where Human Use is High

Although human use can be detrimental to low and vulnerable populations of wildlife, it can be beneficial to public relations efforts because you can reach a lot of people. It also helps if people can see the animals; if they can see them, they can relate to them in a more personal way. One of the characteristics of the Park reintroduction was that it is the most heavily visited Park in the Nation, and the reintroduction location was the most heavily visited part of the Park (Phillips *et al.* 1995). The reintroduction area also contained significant pastureland that the wolves used. As a result, thousands of visitors saw the red wolves in the wild, and visitation increased because of the possibility that one might see the animals. This, in turn, resulted in increased support for the program. Of course, there are also negatives associated with areas where human use is high. There will be an increase in adverse human/wolf interactions, such as food being snatched by red wolves at camping sites, which can lead to the wolves' being more tolerant of humans. Heavy traffic on the already limited access roads can also hinder monitoring activities and slow the response time to get to potential problem situations.

Be Consistent and Carry Through with What You Say

In rural communities, many residents adhere to the principle of a person keeping their word. Residents expect the same thing from all neighbors, including the government. This is a real problem in government agencies because of the turnover in personnel. The red wolf program is still haunted by the fact that a few local residents believe some commitments regarding management of the program were not followed. Although we failed to find any written documentation of these commitments, we cannot emphatically state that they were not verbally made. We should be very careful in public meetings and individual conversations to not veer off on a tangent and tell people what they want to hear in order to be accommodating. Such statements will certainly come back to haunt you. It would be advisable to tape record or video (including audio) the proceedings at public meetings in order to have a record of what was said. We must also guard against (1) making assumptions that may not pan out, (2) presenting things as facts that are not facts, or (3) presenting facts based on information from different areas that may not apply at all to the reintroduction area under consideration. For example, the only information about red wolf food habits that was available when the recovery work began was from coastal Texas and Louisiana, and it indicated that small mammals were the primary prey (Shaw 1975). In NENC, deer were the primary prey (Kelly 1994), and some people thought that we had misled them into believing that deer would not be taken by red wolves. You must be

very honest in admitting things you do not know or do not have an answer for, and you should clearly indicate the source of all available information and state why it might not be the same in a different area.

Keeping your word is also important in individual relationships with residents. We have told local residents that we will respond promptly to possible red wolf depredations and will work with the landowner to determine the cause of the depredations, even if we have information indicating that radio-collared red wolves are not involved. An example from NENC involved a resident who suffered depredations to domestic rabbits. The owner of the rabbits was irate about what he assumed were depredations by red wolves. A monitoring station was established at the location, and it supported our general aerial monitoring information that there were no red wolves in the vicinity. As this was not sufficient to calm the owner, traps were set. A neighbor's dog was caught and determined to be the culprit. These efforts turned the owner's attitude toward the reintroduction program into a positive one. He became an outreach partner, displaying literature about the program at his business office.

Monitor Public Attitudes and Revise the Program, if Necessary, to Improve Attitudes

Although support for the reintroduction of red wolves was present when the releases began, the red wolf program continued to be plagued by negative publicity based on false information, misinterpretations, etc. Based on the support expressed for the program, this negative publicity was believed to have been largely generated by a minority of the public. However, this minority likely included some influential and financially well-heeled individuals, such as owners of large parcels of land, news media personnel, and politicians, who lent credibility to the accusations in certain news media and political arenas. This negative publicity was countered by conducting and publicizing public attitude surveys showing that the majority of people, and especially people in the immediate area of the reintroduction, supported the program (Mangun *et al.* 1997, Quintal 1995, Rosen 1997). We believe these survey results are a significant factor in generating and maintaining public support.

Be Realistic and Prudent With Funding

Reintroductions are very costly, and the amount of funding available for endangered species recovery is limited. In addition, we are public servants, who must use public funds wisely. Although decisions to stop funding work on endangered species are difficult, it is incumbent on us to be realistic and prudent in the use of public money. If a reintroduction is unsuccessful, the project should be stopped and money should be redirected to higher priorities within a recovery program or made available to other endangered species, many of which are not adequately funded for recovery work. The Service terminated the Park reintroduction in 1998 based on the lack of survivability in pups and the inability of the red wolves to establish home ranges within the Park (U.S. Fish and Wildlife Service 1998).

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